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Editorial: Does Vegetation Science Exist?

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EDITORIAL

Does Vegetation Science exist?

Previous editorials have mostly considered the 'Journal' aspect of the Journal of Vegetation Science. I examine the 'Vegetation Science' aspect, and compare it with Yeti Science.

The Yeti

The Journal of Yeti Science, if it existed, would presumably contain descriptions of the Yeti, and investigations of its ecology. The Yeti, or 'Abominable Snowman', is a creature alleged to live in the high Himalayas. It walks on its rear legs, is large and hairy, and may be humanoid. I find it hard to explain to my four year-old daughter that perhaps the Yeti exists, and perhaps it doesn't; she likes things to be certain.

Sightings of yetis have been made by native sherpas and professional climbers, but without evidence that they **are** yetis (McNeely, Cronin & Emery 1973; Shackley 1983). Photographs have been taken, claimed to be of 'yeti footprints', but it is uncertain what they are photographs of (Tschernezky & Cooke 1975). The footprints could have been enlarged by snow melt and re-freezing. Several expeditions have directly sought evidence that Yetis exist (Cooke 1975), but no convincing evidence has been found.

Plant communities

The Journal of Vegetation Science contains descriptions of plant communities, and investigation of their ecology. It is clear that: a. Plant species co-occur; b. Plant species differ in their tolerance of environmental conditions; c. Plant species can affect each other, usually by interference, but sometimes there is mutualism. Sometimes the effects can be drastic (Cross 1982; Vitousek & Walker 1989). Any layman, especially a gardener, could tell us all this. But do plant communities exist in any more meaningful sense, as integrated, discrete entities? Are there phytosociological limitations on the occurrence or abundance of plant species? Are there 'Assembly' rules such as Diamond (1975) claimed to find for the birds on islands around New Guinea?

I find it hard to explain to university students that perhaps plant communities exist, and perhaps they don't.

Descriptions of plant communities have been made by naturalists and by professional ecologists, but without evidence that they **are** plant communities, as defined above. Photographs have been taken, claimed to be of plant communities, but it is uncertain what they are

photographs of. Several ecologists have directly sought evidence that plant communities exist.

For example, in my own work, I have looked for niche limitation (Wilson, Gitay & Agnew 1987; Wilson & Sykes 1988), for guild proportionality (Wilson 1989), for incidence functions and nesting (Wilson 1988), for the effect of a change in canopy tree species at an ecotone (Wilson & Allen 1990), for consistency of species associations on different continents (Wilson, Hubbard & Rapson 1988), and for discontinuities in the range of tolerance among species (Sykes & Wilson 1990). No convincing evidence for the existence of plant communities has emerged. Species-diversity studies have shed no light on the question (Whittaker 1977). Dominance-diversity relations can be deduced from ecological theory (Wilson 1991), and one can find differences between communities, but no patterns (Watkins & Wilson in prep.).

Can others find evidence that I cannot? Drake (1990) is a strong exponent of assembly rules. He (op. cit.) cites two papers¹ which, he says, document assembly-rule phenomena in higher plants. One is McCune & Allen (1985), who found differences in vegetation that they could not correlate with the environmental values they measured. Surely we've all had that problem! Theirs was a bad case - the environmental factors could explain only 10% of the variation. They blamed historical factors. McCune & Allen explicitly state: "there seems to be no reason to believe that ... the species obey 'assembly rules' ". Drake's other example is Abrams, Sprugel & Dickmann (1985)². The latter observed that where jackpine forest had been removed by clearfelling without burning, *Carex pensylvanica* was dominant up to 6 yr after the disturbance. When the forest had been burnt, this happened on only some sites. No reason was suggested. I cannot find an assembly rule here. Is there no evidence for plant communities? Three pieces of evidence particularly interest me:

1. Vegetation almost always comprises several species. Why? This is Hutchinson's Paradox of the Plankton. I know of 12 explanations for the Paradox. Among them, disturbance is currently fashionable. I recently surveyed the evidence from New Zealand (Wilson 1990), and reached different conclusions. Perhaps I just refused to go along with fashion. We have really no idea which are the important factors.

2. Gentry (1988) suggested that tropical rain forest

different continents had very similar family representation. I find this a remarkable assembly rule. Are there family niches? I would not have guessed so for most families. Such a suggestion needs to be judged against a null model, but Gentry did not have one.

3. Mohler (1990) observed that in American oak forests the two most dominant oak species were usually from different subgenera. Statistical analysis confirmed this for 12 of the 14 regions he examined. Mohler considers various explanations: disease/pest pressure, niche differences in fruiting phenology through mast fruiting, dispersal differences, etc., but rejects them all, at least as complete answers. That is not far short of the total evidence we have for the existence of plant communities. I conclude that the evidence for the existence of plant communities is even weaker than that for the Yeti.

What else could a Vegetation Scientist do?

Are there other ways to examine vegetation, without assuming assembly rules for plant communities? Some have emphasised plant form instead of species. E.g. Halloy (1990) devised a complicated system for the life form of alpine plants. Barkman (e.g. 1988, 1990) used much simpler attributes to describe the 'texture' of a wide range of vegetation. But these approaches are meaningful only if general and non-trivial patterns can be found, and so far none have. We can describe vegetation, and vegetation processes in the hope that general and non-trivial patterns will emerge, but they never seem to.

Does Vegetation Science exist?

The existence of a Journal of Vegetation Science assumes that there is Vegetation Science. In what sense? Most disciplines would not put up with such an inability to find useful theories. Isn't it only the fact that we like vegetation that keeps us going as Vegetation Scientists?

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¹ Drake's table contains three references for trees, but '43' seems to be an error (Drake, pers. comm.).

² '37' in Drake's table is a misprint for '36', Abrams, Sprugel & Dickmann (1985) (Drake, pers. comm.).

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